

Faculty of Engineering

MINOR COURSE REVISION

1. COURSE DETAILS

1.1 Course ID

COMP4141

1.2 Course name - Long

Theory of Computation

1.3 Course name - Abbreviated

Theory of Computation

1.4 Undergraduate / ~~Postgraduate~~ / ~~Other~~ (delete what is not applicable)

1.5 Course Authority

Kai Engelhardt

ext/email

x54497/kaie@cse.unsw.edu.au

1.6 Organisational Unit responsible for course

School/Department:

CSE

AOU Code:

1.7 Justification of Proposal

Previously, this subject was only available to a select few 4th year students. Its content needed to be adjusted to appeal to a broader range of students and cover the basic notions of theoretical computer science in a more accessible manner.

1.8 Consultation Process

CSE teaching committee incl. stureps; colleagues who teach similar subjects overseas

1.9 Session/s offered

S1 and/or X1

1.10 Current Course Description Entry in the Relevant University Handbook

COMP4141 Theory of Computation

Staff Contact: A/Prof A Sharma

UC 6 S1 L3 T1

Prerequisites: Undergraduates: A total of 75% in level 3 COMP courses, min of 18uc;
Postgraduates: 75% in Group B/C courses, min of 18uc.

Computability: primitive recursive functions, computable functions, universal programs, undecidability, Church-Turing thesis, Turing machines, recursively enumerable sets and elementary recursive function theory; Complexity: the sets P and NP, NP-completeness and Cooks theorem. Logic: predicate logic and its unsatisfiability problem.

1.11 Proposed New Course Description Entry in the Relevant University Handbook

COMP4141 Theory of Computation

Staff Contact: Dr Kai Engelhardt

UC 6 S1 L3 T1

Prerequisites: Undergraduates: COMP2011 or COMP2711

Postgraduates: COMP9024

Computability: formal languages and problems, Turing Machines (TMs), computability, (semi-)decidability, universal TMs, Church-Turing thesis, halting problem, reduction and undecidability proofs, examples; Complexity: run time, space, complexity classes, non-determinism and NP, polynomial reductions and NP completeness, optimisation problems and approximation, randomisation; Languages and Automata: regular expressions and languages, finite automata, determinisation, context-free grammars and languages (CFLs), Chomsky normal form, word problems, pumping lemma, push-down automata, decidability problems for CFLs; Semantics and Correctness: while programs, assertions and program correctness, Hoare logic, loops and loop invariants, relative completeness of Hoare logic (and its role in a proof of Gödel's incompleteness result)

2. AUTHORISATION

2.1 School Education Committee Chairman's Approval

Note: *this section of the Proposal must be signed by the School Education Committee Chairman, stating:*

I have examined the resource implications of the above proposal in regard to staff, space, materials, equipment, capital funds, and computing, and certify that the School can cover the demands that are inherent in it.

Further Comments:

School Education Committee

Chairman

/ /2006

2.2 Dean's Approval

Note: *this section of the Proposal must be signed by the Dean, stating:*

I have examined the resource implications of the above proposal in regard to staff, space, materials, equipment, capital funds, and computing, and certify that:

(Tick whichever is applicable)

- 3.3.1 (i) the proposal involves no additional resources. (A statement from the Head of School explaining how this can be achieved must be provided); or
- (ii) the proposal involves additional resources and it is proposed to redeploy existing resources within the faculty. (A statement from the Head of School explaining how this will be achieved must be provided); or
- (iii) the proposal involves additional resources to be obtained as set out below; or
- (iv) the additional resources essential to bring the proposal into effect cannot be found within resources available to the faculty.

Dean
/ /2006